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Investigation of language and motor skills in Serbian speaking children with specific language impairment and in typically developing children

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ABSTRACT

Specific language impairment (SLI) is usually defined as a developmental language disorder which does not result from a hearing loss, autism, neurological and emotional difficulties, severe social deprivation, low non-verbal abilities. Children affected with SLI typically have difficulties with the acquisition of different aspects of language and by definition, their impairment is specific to language and no other skills are affected. However, there has been a growing body of literature to suggest that children with SLI also have non-linguistic deficits, including impaired motor abilities. The aim of the current study is to investigate language and motor abilities of a group of thirty children with SLI (aged between 4 and 7) in comparison to a group of 30 typically developing children matched for chronological age. The results showed that the group of children with SLI had significantly more difficulties on the language and motor assessments compared to the control group. The SLI group also showed delayed onset in the development of all motor skills under investigation in comparison to the typically developing group. More interestingly, the two groups differed with respect to which language abilities were correlated with motor abilities, however Imitation of Complex Movements was the unique skill which reliably predicted expressive vocabulary in both typically developing children and in children with SLI.

1. Introduction

Developmental language disorders are usually considered primarily from a linguistic point of view, hence the widely accepted term 'specific language impairment'. This diagnostic term refers to children who do not acquire language typically, despite having normal hearing, absence of emotional or neurological deficits, autism, or social deprivation (Leonard, 1998). The language abilities of children with SLI are below their chronological age and are disproportionately affected compared to the development of their other non-linguistic skills.

There are two main strands in the theoretical explanations of SLI. On one hand, there are linguistic accounts, which assume innate-based knowledge, and explain the language deficits in children with SLI as resulting from impaired language representations (for example, Clahsen, 1989; Gopnik, 1990; Rice, Wexler, & Cleave, 1995). These accounts focus on the

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linguistic deficits observed in SLI and these linguistic deficits are explained in terms of missing rules, incomplete grammatical knowledge, grammatical feature blindness, etc. Thus, by definition, linguistic accounts of SLI do not look for non-linguistic abilities as a possible source for the observed language deficits in this population. On the other hand, there are performance-based accounts, which explain the deficits found in SLI as resulting from limitations in the linguistic system or processing capacity (Bishop, Carlyon, Deeks, & Bishop, 1999; Gathercole & Badeley, 1990, etc.). Thus these accounts focus on other cognitive abilities, such as memory and attention, mental imagery, or speed of processing as possible sources for the language deficits found in SLI (see Leonard, 1998 for a review).

It is widely recognised that SLI is a heterogeneous disorder and a number of different subgroups have been defined (Conti-Ramsedn, Crutchley, & Botting, 1997; Rapin & Allen, 1987). Research has also shown that SLI is often accompanied by non-linguistic cognitive deficits, including deficits in attention (Tallal, Dukette, & Curtiss, 1989), perceptual deficits (Tallal et al., 1993), and motor deficits (Hill, 2001). It has also been shown that children with other primary deficits, such as those with verbal sequencing deficits (Dewey, Roy, Square-Storer, & Hayden, 1988) and developmental dyslexia (Nicolson & Fawcett, 1994; Wolff, Melngailis, Obregon, & Bedrosian, 2005) may have difficulties with some motor tasks. On the other hand, it has also been reported that children with developmental coordination disorder (DCD) have expressive language deficits which are similar to those of children with SLI (Archibald & Alloway, 2008). In addition, motor control has been argued to be associated with language ability, both in typical and in atypical populations (Alcock, 2006).

In typically developing children, language and other skills (in this case motor skills) develop in a fairly integrated manner, which makes it difficult to disentangle individual components and contributing processes (Reilly & Wulfreck, 2004) and to reliably predict which developmental skills are important for successful language acquisition. However, atypical populations, such as children with SLI, in which the relationship between different skills might differ from what is found in typical development, offer natural experiment that allows improved investigations and evaluation of the skills underlying language.

The first aim of the current paper is to contribute to the ongoing theoretical debate with regard to the underlying nature of SLI by focusing on the examination of motor and language abilities in Serbian speaking children with SLI and in particular, by investigating the development of different motor skills in children with SLI in terms of onset and rate in comparison to typically developing children. The second aim is to investigate whether motor abilities can predict language skills so that we can contribute to current knowledge and understanding of this developmental disorder. Therefore we investigated the following:

(1) The motor abilities of a group of children with SLI compared to a group of typically developing (TD) children;
(2) The language abilities of a group of children with SLI compared to a group of TD children;
(3) The relationship between motor abilities and aspects of language in the SLI group in comparison to the TD group;
(4) The issue of whether motor abilities predict language skills in SLI and in TD children.

2. Methods

2.1. Participants

There were thirty children with SLI (8 female and 22 male), aged between 48 and 84 months (4–7 years of age) with a mean age of 68.9 months (SD 12.02 months). They were recruited through the Institute for Experimental Phonetics and Speech Pathology in Belgrade, Serbia. The diagnosis of SLI was given to the children by a qualified speech and language therapist. The exclusionary criteria were: no psychological or neurological problems, no autism, no attention deficit and hyperactivity disorder and no hearing loss. SLI children included in the study had IQ between 89 and 110 (see Table 1) on the Revised Weschler's Intelligence Scale for Children (RWISC), which has been normed on the Serbian population (Biro, 1997).

There was a control group of 30 TD. There were 7 girls and 23 boys with an age range of 48 and 84 months and a mean age of 68.9 months (SD 12.4 months). They were matched to the children with SLI on chronological age such that there were no significant between group differences on chronological age (t-test = .132, $p > .05$). The control children were recruited through a nursery school. The TD children were also matched to the SLI group on gender and full-scale IQ; their IQ was between 90 and 110 (Table 1). The children in the control group had no speech or language problems and there has never been any concern about their language, motor or cognitive development.

All the participants (SLI and TD) were monolingual native speakers of Serbian. Consent was obtained from the parents as well as from the children themselves prior to their participation in the study.

Table 1
Comparison of participants based on their standardised scores on the RWISC III.

SLI children		Control children	
Mean	SD	Mean	SD
98.60	11.10	99.10	10.02

t-Test = .96; $p > .05$.